figures (Table I.), at temperatures from − 5° to + 100°, taking the volume at 4° equal to 1,000,000, and the pressure being equal to one atmosphere, appear as follows in the second column (V_t) of the subjoined table. They are followed, in the third column, by the volumes as calculated from Prof. Mendeleeff's new formula :—

t.	V_t.	$V_t = \frac{1}{S_t}$ calculated from the formula.	$\frac{dV}{dt}$ for 1°.	$\frac{dV}{dp}$ for 1 atmosphere.	Possible errors of the present determinations.
−5°	1 000 662	1 000 676	−157	−52	∓ 29
0	1 000 122	1 000 127	− 65	−50	∓ 12
+5	1 000 008	1 000 008	+ 15	−48	± 3
10	1 000 263	1 000 262	+ 85	−47	± 15
15	1 000 847	1 000 849	+148	−46	± 26
20	1 001 733	1 001 731	+204	−45	± 35
25	1 002 871	1 002 880	+254	−44	± 43
30	1 004 248	1 004 276	+302	−43	± 49
40	1 007 700	1 007 725	+386	−41	± 59
50	1 011 933	1 011 967	+461	−40	± 67
60	1 016 915	1 016 926	+530	−39	± 75
70	1 022 513	1 022 549	+595	−40	± 85
80	1 028 849	1 028 811	+656	−41	± 98
90	1 035 719	1 035 692	+719	−42	±118
100	1 043 180	1 043 194	+781	−44	±145

Finally, a third table is given, being the result of the calculation made by taking

$$S = 1 - \frac{(t-4)^2}{1000\phi(t)},$$

$$\phi(t) = 128{\cdot}78 + 1{\cdot}158t - 0{\cdot}0019t^2,$$

and

$$1000\phi(t) = 1{\cdot}90\ (94{\cdot}10 + t)\ (703{\cdot}51 - t),$$

and extending the calculation to + 200° and − 10°. The most important values of $\frac{ds}{dt}$ are given in the fourth column of the subjoined table ; so, also, the approximate values of $\frac{ds}{dp}$, which are "but a first rough approximation," to show the importance of pressure in the determinations of volumes of water :—

$t°$ C.	Calculated densities, S_t.	Possible error of present measurements (in 1,000,000th parts).	Derived ds/dt for 1° C. (in 1,000,000th parts).	Derived ds/dp for 1 atmosphere (in 1,000,000th parts).	Numerical values of $\phi(t)$.	Calculated V_t.
−10	0·998 281	∓ 49	+ 264	+54	114·01	1·001 722
5	999 325	∓ 29	+ 157	52	119·94	000 676
0	999 873	∓ 12	+ 65	50	125·78	000 127
+ 5	999 992	± 3	− 15	48	131·52	000 008
10	999 738	± 15	− 85	47	137·17	000 262
15	999 152	± 26	− 148	46	142·72	000 849
20	998 272	± 35	− 203	45	148·18	001 731
25	997 128	± 43	− 254	44	153·54	002 880
30	995 743	± 49	− 299	43	158·81	004 276
40	992 334	± 53	− 380	+41	169·06	1·007 725
50	988 174	65	− 450	40	178·93	011 967
60	983 356	72	− 512	39	188·42	016 926
70	977 948	80	− 569	39	197·53	022 549
80	971 996	92	− 621	40	206·26	028 811
90	965·537	109	− 670	41	214·61	035 692
100	958 595	133	− 718	42	222·58	043 194
120	943 314	±600	− 810	+43	237·38	1·060 093
140	926 211	650	− 901	48	250·66	079 667
160	907 263	700	− 995	55	262·42	102 216
180	886 393	750	− 1093	64	272·66	128 167
200	863 473	800	− 1200	73	281·38	158 114

In conclusion, Prof. Mendeleeff repeats that he proposes as soon as possible to make anew the determinations of the densities of water, because the former determinations were made on assumptions (permanency of the coefficient of the expansion of glass and mercury, and no notice being taken of pressure) which can no longer be maintained. If new measurements confirm the formula, or lead to a more correct one, we shall be better able to understand the laws of the expansion of all liquids, and therefore of gases as well. "In the case of water," he says, "we have begun to understand more clearly the influence of heat upon densities and volumes, and I believe that with the help of water we may expect some further progress in the study of the influence of heating upon matter."

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The examiners in the Final Classical Schools issued the Class List on Wednesday week, completing the results of the examinations held in Trinity Term.

The summer meeting of Extension students commenced on Friday last, when Mr. Frederic Harrison, M.A. Wadham College, delivered the inaugural lecture. The popularity of the movement is proved not only by the continual increase in the number of students who avail themselves of the advantages offered by this system of education, but by the interest which foreign Governments are taking in the development of the plan. The French Government have sent two special commissioners to report on the prospects and condition of the University Extension movement, and a large number of the representatives of the American University Extensionists are now in Oxford.

The number of students attending the various lectures is greater than on any previous occasion, more than 1100 having subscribed, while last year the number did not greatly exceed 900. A more rapid growth and a still greater measure of success attending the work may be anticipated from the fact that various County Councils, finding themselves in possession of funds arising from the operation of the Local Taxation Act, and which they propose to devote to the purposes of technical instruction, are availing themselves of the machinery of the University Extension system to accomplish this desirable end.

SCIENTIFIC SERIALS.

IN the *Botanical Gazette* for June, Mr. T. Holm contributes a study of some anatomical characters of North American grasses. In a paper entitled "On the Relation between Insects and the Forms and Characters of Flowers," Mr. T. Meehan epitomizes his views on fertilization opposed to the current theory, viz. that the part played by insects in the fertilization of flowers has been greatly exaggerated ; that flowers do not abhor cross-pollen ; and that all annuals can self-fertilize when cross-fertilization fails, annuals in almost all cases having every flower fertile.

THE most important paper in the *Journal of Botany* for July is the commencement of a detailed account of the Algæ of the Clyde sea-area, by Mr. George Murray, Secretary to the Committee for the Exploration of the Marine Flora of the West of Scotland. This is prefaced by an account of the physical features of the Clyde sea-area, by Dr. John Murray. Following this is the commencement of a hand-list of the Algæ, by Mr. E. A. L. Batters. The Rev. H. G. Jameson concludes his key to the genera and species of British mosses, which it is hoped may be published in a separate form ; and Mr. George Murray sinks Hooker's genus of sea-weeds *Cladothele* in *Stictyosiphon*.

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, July 27.—M. Duchartre in the chair.—Proofs that Asia and America have been connected in recent times, by M. Emile Blanchard. In this paper the author points out certain species of Asiatic fauna and flora which are found in North America, as, in the preceding one, he indicated the representatives of European fauna and flora which occur in the same continent. Without making an extensive enumeration of the

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different species, the facts brought forward give considerable support to the idea that Europe, Asia, and America have been connected by land in comparatively recent times.—The Ichthyosaurus from St. Columbe, by M. Albert Gaudry. This is a description of an Ichthyosaurus exhibited at the Paris Exhibition of 1889. It is proposed to name the fossil *Ichthyosaurus burgundiæ*.—Examination of samples of native iron of terrestrial origin discovered in gold washings from the environs of Berezowsk, by MM. Daubrée and Stanislas Meunier. The specimens examined weighed respectively 11·5 grams and 72 grams, and were discovered near the Berezowsk gold mines, Persia. The metal is very magnetic, but manifests no polarity. Its density is 7·59. When treated with an acid it is sensibly attacked, but does not show the Widmanstätten figures as is the case when acid is applied to a clean face of meteoritic iron. This fact and the absence of nickel leads the authors to conclude that the iron is truly native. About one per cent. of platinum is present.—On the volatility of nickel under the influence of hydrochloric acid, by M. P. Schützenberger. When dry hydrogen is passed over pure anhydrous nickel chloride at a red heat, it may be shown that the hydrochloric acid gas which comes off from the tube in which the reduction occurs contains a sensible amount of metal in the form of a volatile product. The same result is obtained if, instead of reducing nickel chloride by hydrogen, finely divided nickel is acted on by dry hydrochloric acid gas. M. Schützenberger has not yet been able to isolate this body for the purpose of determining its constitution.—Note on a proposed Observatory on Mont Blanc, by M. J. Janssen.—On the retardation of luminous impressions, by M. Mascart.—Works of applied zoology effected at the Endoume maritime station during 1890, by M. A. F. Marion.—On a geometrical representation and formula expressing the law of the passage of perfect gases through orifices, by M. Henri Parenty.—On the densities of oxygen, hydrogen, and nitrogen, by M. A. Leduc. The values obtained are: hydrogen 0·0695, oxygen 0·1050, nitrogen 4·9720. From the densities of oxygen and nitrogen the percentage proportion of the former element in air is found to be 23·235 by weight and 21·026 by volume. The atomic weight of nitrogen deduced from these results is 13·99, and that of oxygen 15·905.—Remarks on the transport of metallic iron and nickel by carbon monoxide, by M. Jules Garnier. Some observations of the character of the flames issuing from furnaces in which these metals are being reduced are shown to be easily explained in the light of recent work on iron and nickel carbonyls.—Action of water on the basic salts of copper, by MM. G. Rousseau and G. Tite. Certain borates and oxychloride of antimony are transformed to oxides by the prolonged action of water at a sufficiently high temperature. Similarly, by heating copper nitrate, brochantite, and atacamite with water in sealed tubes they have been reduced to oxides. Libethenite has been experimented upon, but has resisted the transformation even when kept in the presence of water for three days at a temperature of 273° C.—On an actual mode of formation of mineral sulphides, by M. E. Chuard.—Researches on thallium, by MM. C. Lepierre and M. Lachaud. Thallium chromate has been prepared by acting on thallium sulphate with potassium chromate. Reactions with various bodies are described.—On parabanic and oxaluric acids, by M. W. C. Matignon. The heat of combustion of parabanic acid is found to be 212·7 cal., of oxaluric acid 211 cal. Hence the heats of formation have been calculated, 139·2 cal. and 209·9 cal. The heat of solution of parabanic acid at 20° and with a concentration of $\frac{1}{20}$ mol. per litre is − 5·1 cal. The formation from oxalic acid of its ureide, parabanic acid, gives + 2·2 cal. and of its uramic acid, oxaluric acid, + 2·5 cal. The formation of the ureides thus gives only a feeble heat-liberation. Each of these acids dissolved in a large excess of potash yields the neutral potassium oxalate. Potassium oxalurate has been prepared by dissolving the acid in its equivalent of potash and evaporating. Fine prismatic needles are obtained, differing from the salts of Menschutkin and Strecker. The heat of neutralization of oxaluric acid is 30·2 cal., as against 34·2 cal. for oxalic acid.—The transformation of gallic acid and tannin into benzoic acid, by M. Ch.-Er. Guignet.—On the polymeric acids of ricinoleic acid, by M. Scheurer-Kestner.—On the fermentation of bread, by M. Léon Boutroux. During an examination of the conditions essential for the fermentation of bread, the author has isolated five species of yeast and three species of bacteria. The parts played by each of these organisms are described, and the conclusion is finally drawn that the fermentation of bread consists essentially of a normal alcoholic fermentation of sugar pre-existing in the flour, and that only the yeasts producing alcoholic fermentations are necessary; the ordinarily co-existing alteration of gluten is a subsidiary and unessential action due to some of the bacteria present.—On a thermogenic substance in urine, by M. Paul Binet.—On the transformation of carboxy-hæmoglobin into methæmoglobin, and a new process of examination for carbon monoxide in the blood, by MM. H. Bertin-Sans and J. Moitessier.—On a new apparatus for measuring muscular power, by M. N. Gréhant.—Measure of the muscular power of animals under the action of certain poisons, by MM. Gréhant and C. Quinquaud.—On the concordance of Prof. S. P. Langley's experimental results on the resistance of the air (see Nature of July 23, p. 277) with the values obtained by calculation, by M. Drzewiecki.—Analysis by means of chrono-photography of the movements of the lips during speech, by M. G. Demeny. Using M. Marey's method for photographing objects in rapid motion, the author has succeeded in portraying the movements of the lips during speech, and finds that it is possible to distinguish the letters of the alphabet when the photographic results are spun in a zootrope.—Relation between oscillations of the retina and certain entoptic phenomena, by M. A. Charpentier.—The nanny-goat is not refractory to tuberculosis, by M. G. Colin.—Researches on the pathogenic microbes in muds from the Dead Sea, by M. L. Lortet.—On the excretory apparatus of Carididæ, and on the renal secretion of Crustaceæ, by M. P. Marchal.—On the nervous system of Monocotylidæ, by M. G. Saint-Remy.—Contribution to the natural history of a cochineal, *Rhizœcus falcifer*, Künck, discovered in the greenhouses of the Museum and living on the roots of the vine in Algeria, by MM. Kunckel d'Herculais and Frédéric Saliba.—On specific assimilation in Umbelliferæ, by M. Génean de Lamarlière.—Document relative to the trajectory of the Ensishein meteorite of 1492, by Prof. H. A. Newton.—On the erosion and transport by torrential rivers having glacier affluents, by MM. L. Duparc and B. Baeff.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Cosmical Evolution: E. McLennan (Chicago, Donohue).—The Artillery of the Future and the New Powders: J. A. Longridge (Spon).—British Rainfall, 1890: G. J. Symons and H. S. Wallis (Stanford).—Epidemic Influenza, Notes on its Origin and Method of Spread: Dr. R. Sisley (Longmans).—Essays upon Heredity and Kindred Biological Problems; authorized translation, vol. i., 2nd edition: Dr. A. Weismann, edited by E. B. Poulton, S. Schönland, and A. E. Shipley (Oxford, Clarendon Press).

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